

(12) **United States Patent**  
**Sharma et al.**

(10) **Patent No.:** **US 11,348,163 B1**  
(45) **Date of Patent:** **May 31, 2022**

(54) **SYSTEM FOR PRESENTING SIMPLIFIED USER INTERFACE**

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(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 53 days.

(21) Appl. No.: **16/522,458**

(22) Filed: **Jul. 25, 2019**

(51) **Int. Cl.**  
**G06Q 30/02** (2012.01)  
**G06Q 30/06** (2012.01)  
**G06F 9/451** (2018.01)  
**G06F 3/0482** (2013.01)  
**G06F 3/16** (2006.01)

(52) **U.S. Cl.**  
CPC ..... **G06Q 30/0641** (2013.01); **G06F 3/0482** (2013.01); **G06F 9/451** (2018.02); **G06Q 30/0222** (2013.01); **G06F 3/167** (2013.01)

(58) **Field of Classification Search**  
CPC ..... G06Q 30/0641; G06Q 30/0222; G06F 9/451; G06F 3/0482; G06F 3/167  
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,587,835 B1 \* 7/2003 Treyz ..... G06Q 20/12 705/14.64  
7,637,426 B1 \* 12/2009 Green ..... G06Q 30/06 235/383  
8,204,799 B1 \* 6/2012 Murray ..... G06Q 10/0835 705/26.81

(Continued)

FOREIGN PATENT DOCUMENTS

KR 10-0836754 B1 \* 6/2008 ..... G06Q 30/06  
KR 10-1655372 B1 \* 9/2016 ..... G06F 3/048

OTHER PUBLICATIONS

Carousel Design Pattern [retrieved on Jul. 22, 2019]. Retrieved from the Internet: <http://ui-patterns.com/patterns/Carousel>.

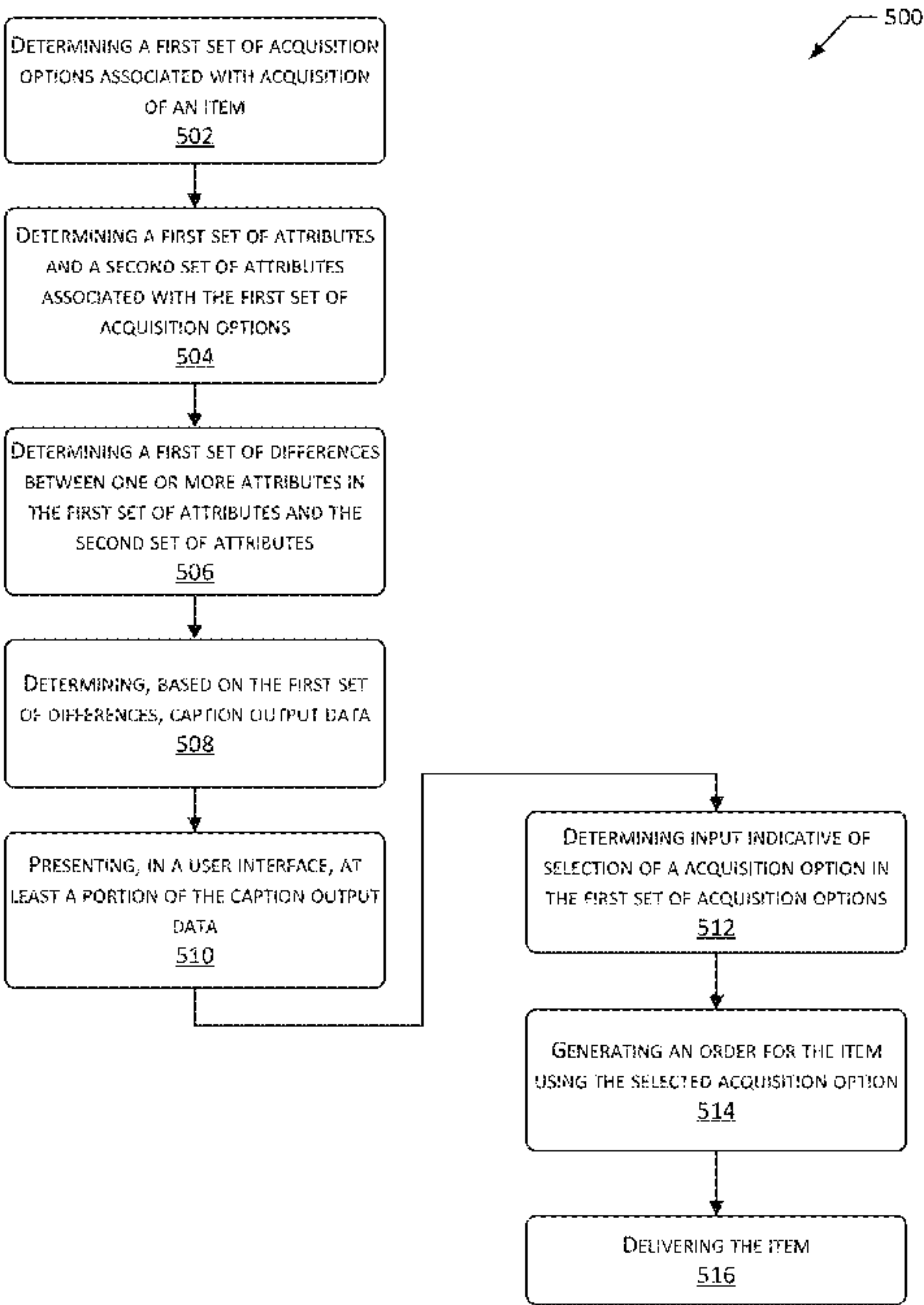
(Continued)

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(57) **ABSTRACT**

Upon selection of an item, several acquisition options may be available for a user to acquire that item. The attributes of these options vary based on price, delivery speed, and so forth. Differences between a reference option and other options are determined. These differences are used to determine a caption identifier. Caption output data is determined based the caption identifier and presented within a user interface with a corresponding control. The control allows the user to acquire the item using the corresponding option. The caption provides the user with a concise and clear reason as to why a particular option is beneficial to the user. For example, a “Willing to wait?” caption shows an acqui-

(Continued)



sition option for which the item is available at lower cost but longer delivery time than the reference option. Services may obtain the caption output from a caption generator using an application programming interface (API).

## 20 Claims, 11 Drawing Sheets

(56)

## References Cited

### U.S. PATENT DOCUMENTS

8,577,740 B1 \* 11/2013 Murray ..... G06Q 10/0835  
705/26.1  
9,430,777 B1 \* 8/2016 Strand ..... G06Q 30/0283  
9,552,566 B1 \* 1/2017 Katz ..... G06Q 20/12  
10,489,841 B1 \* 11/2019 Ogborn ..... G06Q 30/0629  
10,754,518 B1 \* 8/2020 Bell ..... H04L 67/26  
10,754,916 B1 \* 8/2020 Rehn ..... G06Q 10/0833  
10,922,743 B1 \* 2/2021 Andrizzi ..... G06F 3/0481  
2002/0152135 A1 \* 10/2002 Beeri ..... G06Q 30/0253  
705/14.51  
2006/0277118 A1 \* 12/2006 Keohane ..... G06Q 30/0641  
705/27.1  
2007/0005449 A1 \* 1/2007 Mathew ..... G06F 16/958  
705/26.1  
2007/0033110 A1 \* 2/2007 Philipp ..... G06Q 30/0621  
705/5  
2008/0228592 A1 \* 9/2008 Kotas ..... G06Q 10/087  
235/376  
2009/0222337 A1 \* 9/2009 Sergiades ..... G06Q 30/0239  
705/14.23  
2011/0022980 A1 \* 1/2011 Segal ..... G07F 9/023  
715/810  
2011/0082771 A1 \* 4/2011 Pritikin ..... G06Q 30/0641  
705/27.1  
2011/0125609 A1 \* 5/2011 Burger ..... G06Q 10/087  
705/27.1  
2011/0288922 A1 \* 11/2011 Thomas ..... G06Q 30/0224  
705/14.23  
2011/0295670 A1 \* 12/2011 Thomas ..... G06Q 30/0201  
705/14.25  
2012/0078731 A1 \* 3/2012 Linevsky ..... G06Q 30/0603  
705/14.73  
2012/0123910 A1 \* 5/2012 George ..... G06Q 30/0641  
705/27.1  
2012/0166268 A1 \* 6/2012 Griffiths ..... G06Q 30/0222  
705/14.23  
2013/0066750 A1 \* 3/2013 Siddique ..... G06Q 30/0601  
705/27.2

2013/0132238 A1 \* 5/2013 Evans ..... G06Q 30/0641  
705/26.61  
2013/0212487 A1 \* 8/2013 Cote ..... H04N 21/431  
715/745  
2013/0297390 A1 \* 11/2013 Jaquez ..... G06Q 20/12  
705/14.23  
2014/0095264 A1 \* 4/2014 Grosz ..... H04N 1/00  
705/7.36  
2014/0258003 A1 \* 9/2014 Celis ..... G06Q 30/0277  
705/14.73  
2014/0279223 A1 \* 9/2014 Lampert ..... G06Q 30/0625  
705/26.35  
2015/0193859 A1 \* 7/2015 Colello ..... G06Q 30/0635  
705/14.23  
2015/0309706 A1 \* 10/2015 Reed ..... G06F 16/22  
715/771  
2016/0063615 A1 \* 3/2016 Watterson ..... G06Q 30/0643  
705/27.2  
2016/0071149 A1 \* 3/2016 Farshori ..... G06T 19/006  
705/14.51  
2016/0247182 A1 \* 8/2016 Peterson ..... G06Q 30/0222  
2017/0024804 A1 \* 1/2017 Tepfenhart, Jr. ... G06Q 30/0635  
2017/0161728 A1 \* 6/2017 Satyanarayan ..... G06Q 20/401  
2017/0278139 A1 \* 9/2017 Vaya ..... G06Q 30/0269  
2017/0345105 A1 \* 11/2017 Isaacson ..... H04W 12/0609  
2018/0040084 A1 \* 2/2018 Pareek ..... G06Q 30/06  
2018/0130104 A1 \* 5/2018 Montgomery ..... G06Q 30/04  
2018/0197132 A1 \* 7/2018 Nayak ..... G06Q 30/0633  
2018/0218403 A1 \* 8/2018 McDonough ..... G06Q 30/0222  
2018/0268468 A1 \* 9/2018 Levy ..... G06Q 30/0603  
2018/0321818 A1 \* 11/2018 Treadway ..... G06F 9/451  
2018/0365725 A1 \* 12/2018 Smith ..... G06Q 30/0222  
2019/0122245 A1 \* 4/2019 Sahay ..... G06Q 10/08345  
2019/0220883 A1 \* 7/2019 Lore ..... G06Q 30/0222  
2019/0333137 A1 \* 10/2019 Nguyen ..... G06Q 30/0635  
2020/0151659 A1 \* 5/2020 Mangalassery Gregory .....  
G06F 16/29  
2020/0160428 A1 \* 5/2020 Calvo ..... G06Q 10/0834  
2020/0327534 A1 \* 10/2020 Swanson ..... G06Q 20/12  
2020/0357012 A1 \* 11/2020 Kendall ..... G06Q 30/0222  
2020/0387864 A1 \* 12/2020 Shi ..... G06Q 10/0838

### OTHER PUBLICATIONS

Chen, Angela, "Unlocking the Secrets Hidden Inside your Voice", The Verge, Apr. 9, 2019, 1 page. Retrieved from the Internet: <https://www.theverge.com/2019/4/9/18300456/voice-analysis-artificial-intelligence-mental-health-companion-mx-business-privacy>.

\* cited by examiner



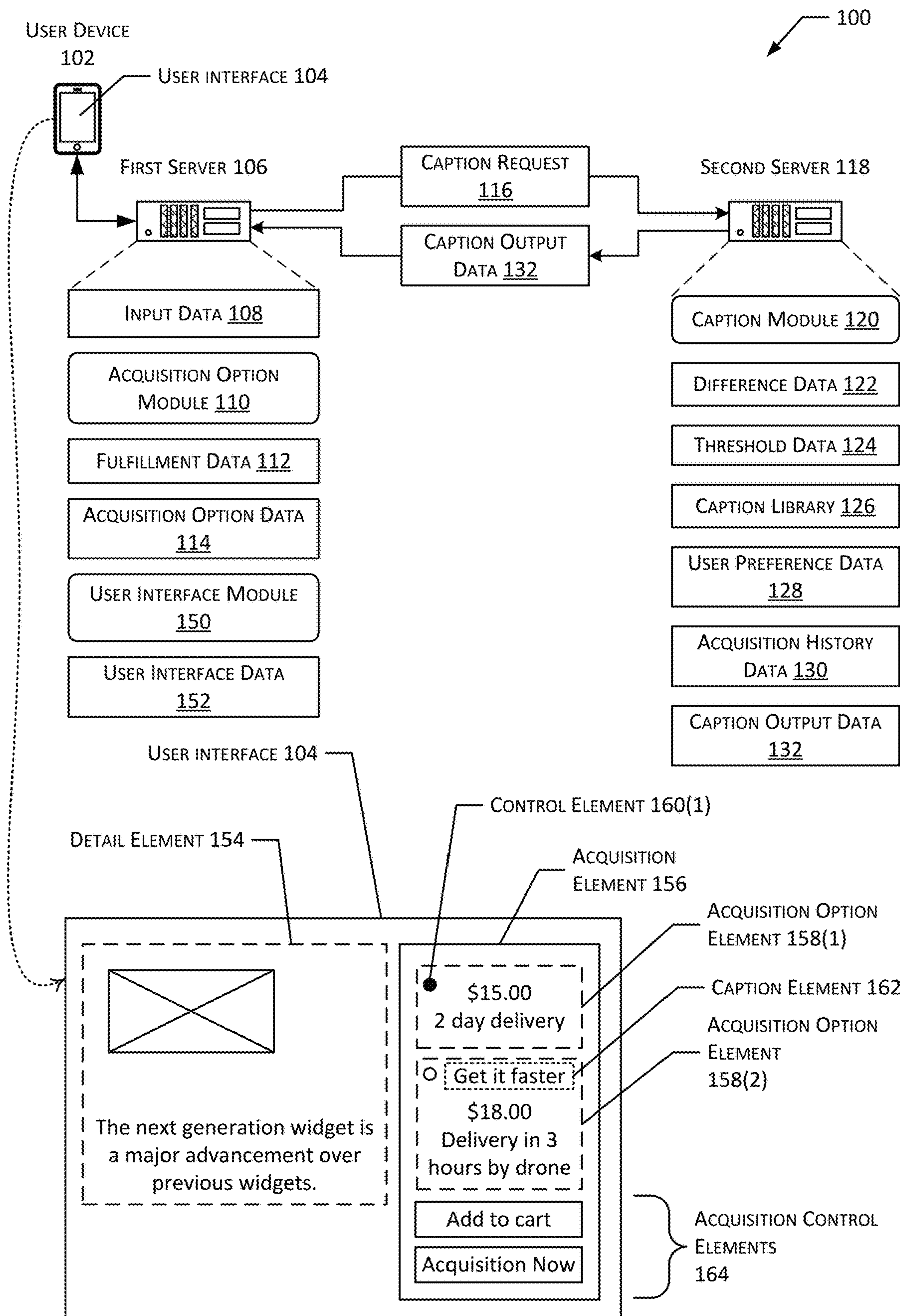
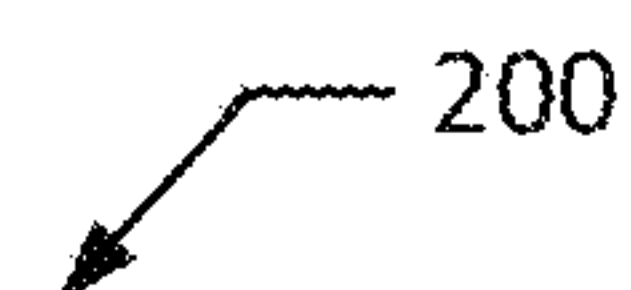
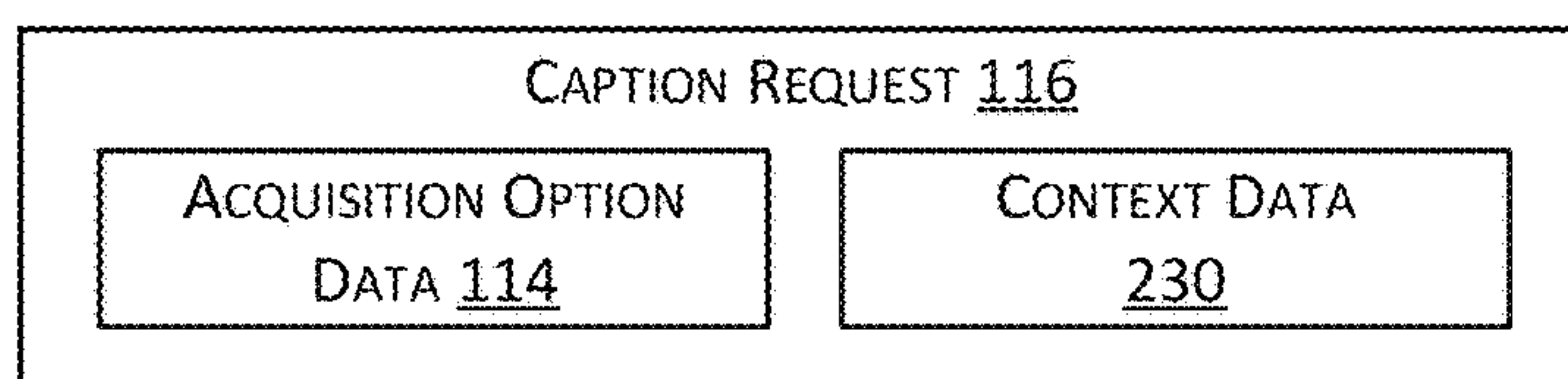


FIG. 1



ACQUISITION OPTION DATA <u>114</u>						
OPTION ID <u>202</u>	OPTION RANK <u>204</u>	ATTRIBUTE DATA <u>206</u>				
		SELLER ID <u>208</u>	PRICE <u>210</u>	DELIVERY TIME <u>212</u>	DELIVERY TYPE <u>214</u>	NEW/USED <u>216</u>
1	1	371	15.00	1.0	GROUND	NEW
2	2	375	13.00	5.5	MAIL	NEW
3	3	377	18.00	0.1	DRONE	NEW



DIFFERENCE DATA <u>122</u>					
OPTION ID <u>202</u>	TYPE(S) OF ATTRIBUTE <u>240</u>				
	SELLER DIFFERENCE <u>242</u>	PRICE DIFFERENCE <u>244</u>	DELIVERY TIME DIFFERENCE <u>246</u>	DELIVERY TYPE DIFFERENCE <u>248</u>	NEW/USED DIFFERENCE <u>250</u>
1	-	-	-	-	-
2	375	-2.00	+4.5	MAIL	NEW
3	377	+3.00	-0.9	DRONE	NEW

CAPTION LIBRARY <u>126</u>			
CAPTION ID <u>260</u>	BENEFIT TYPE <u>262</u>	LANGUAGE ID <u>264</u>	CAPTION TEXT <u>266</u>
89415	SHORTER DELIVERY TIME	EN	GET IT FASTER
89416	SHORTER DELIVERY TIME	EN	NEED IT NOW
89417	LOWER PRICE	EN	LIKE NEW, SAVE WITH USED
89418	LOWER PRICE	EN	USED BARGAIN
89420	LOWER PRICE	EN	WILLING TO WAIT
89421	LOWER PRICE	EN	NO HURRY
89502	TRY	EN	TRY BEFORE YOU BUY

FIG. 2

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USER PREFERENCE DATA <u>128</u>		
USER ID <u>302</u>	PREFERRED BENEFIT TYPE <u>304</u>	PREFERRED LANGUAGE ID <u>306</u>
54815	SHORTER DELIVERY TIME	EN
55913	INCENTIVE PROGRAM	EN
75517	LOWER PRICE	DE

ACQUISITION HISTORY DATA <u>130</u>		
USER ID <u>302</u>	SELECTED BENEFIT TYPE <u>320</u>	SELECTION % <u>322</u>
54815	SHORTER DELIVERY TIME	95
54815	LOWER PRICE	5
55913	LOWER PRICE	100
77517	DELIVERY TYPE	100

CAPTION OUTPUT DATA <u>132</u>		
OPTION ID <u>202</u>	CAPTION TEXT <u>266</u>	CAPTION PRIORITY <u>340</u>
2	WILLING TO WAIT	2
3	GET IT FASTER	1

FIG. 3



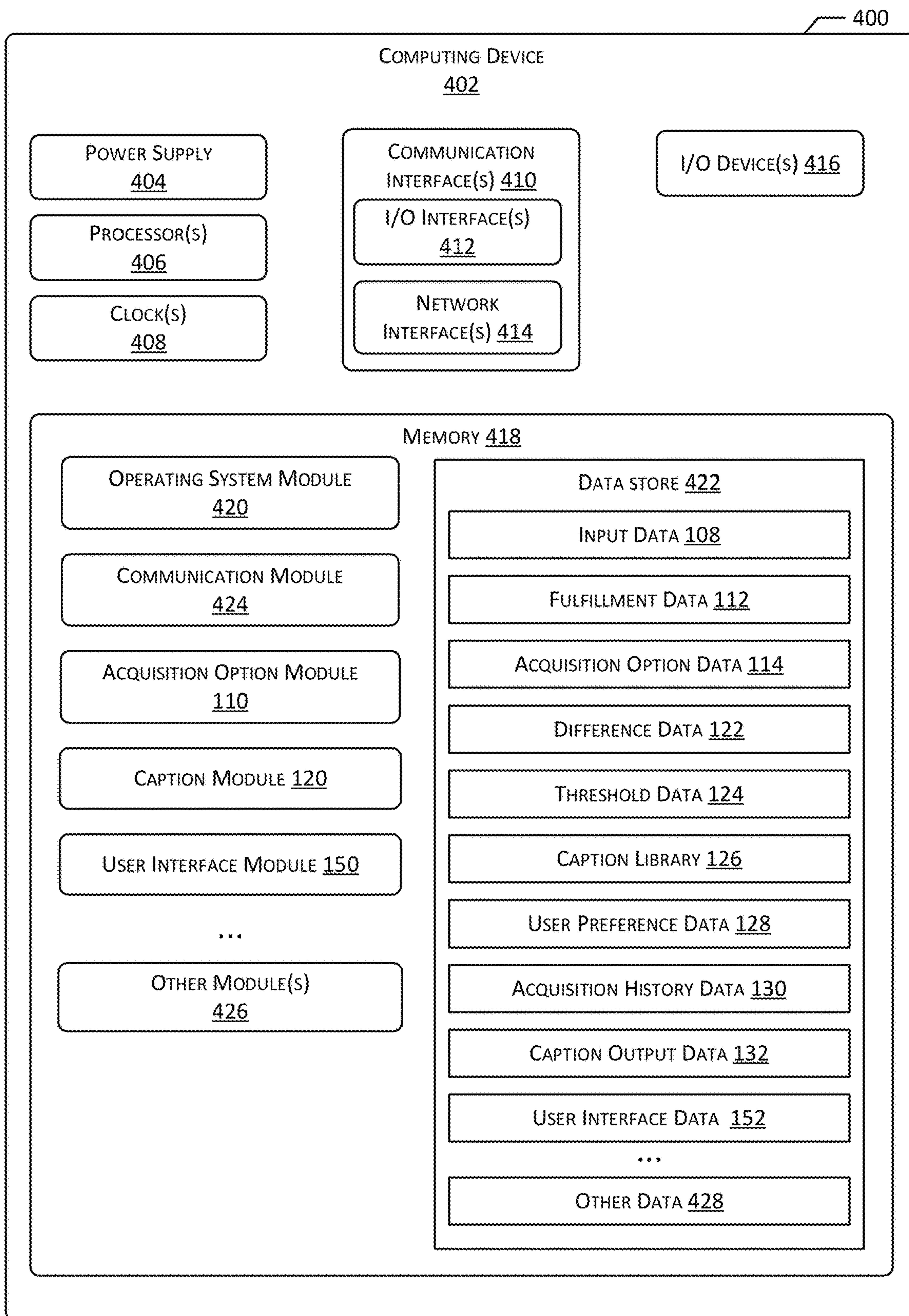


FIG. 4

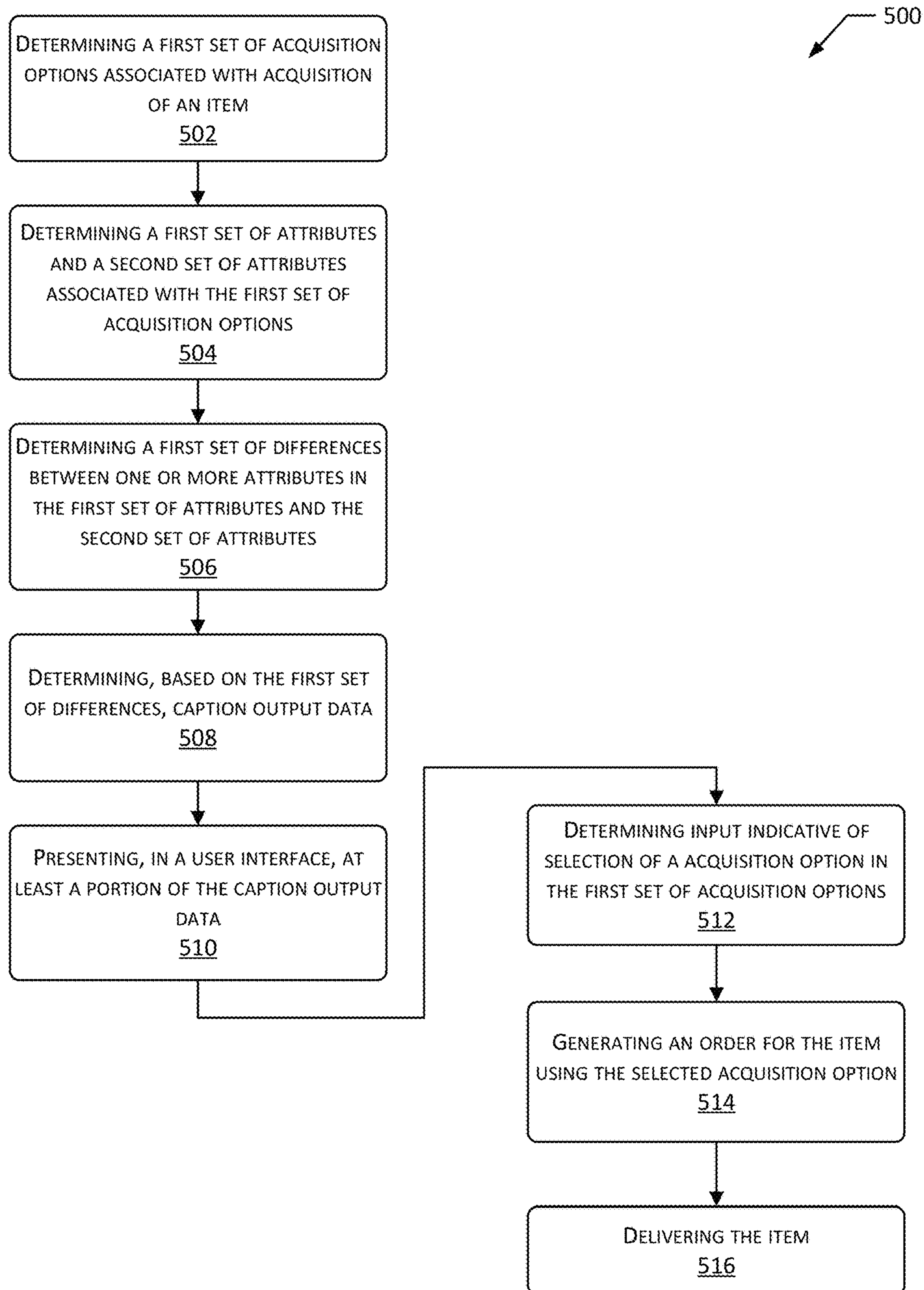


FIG. 5

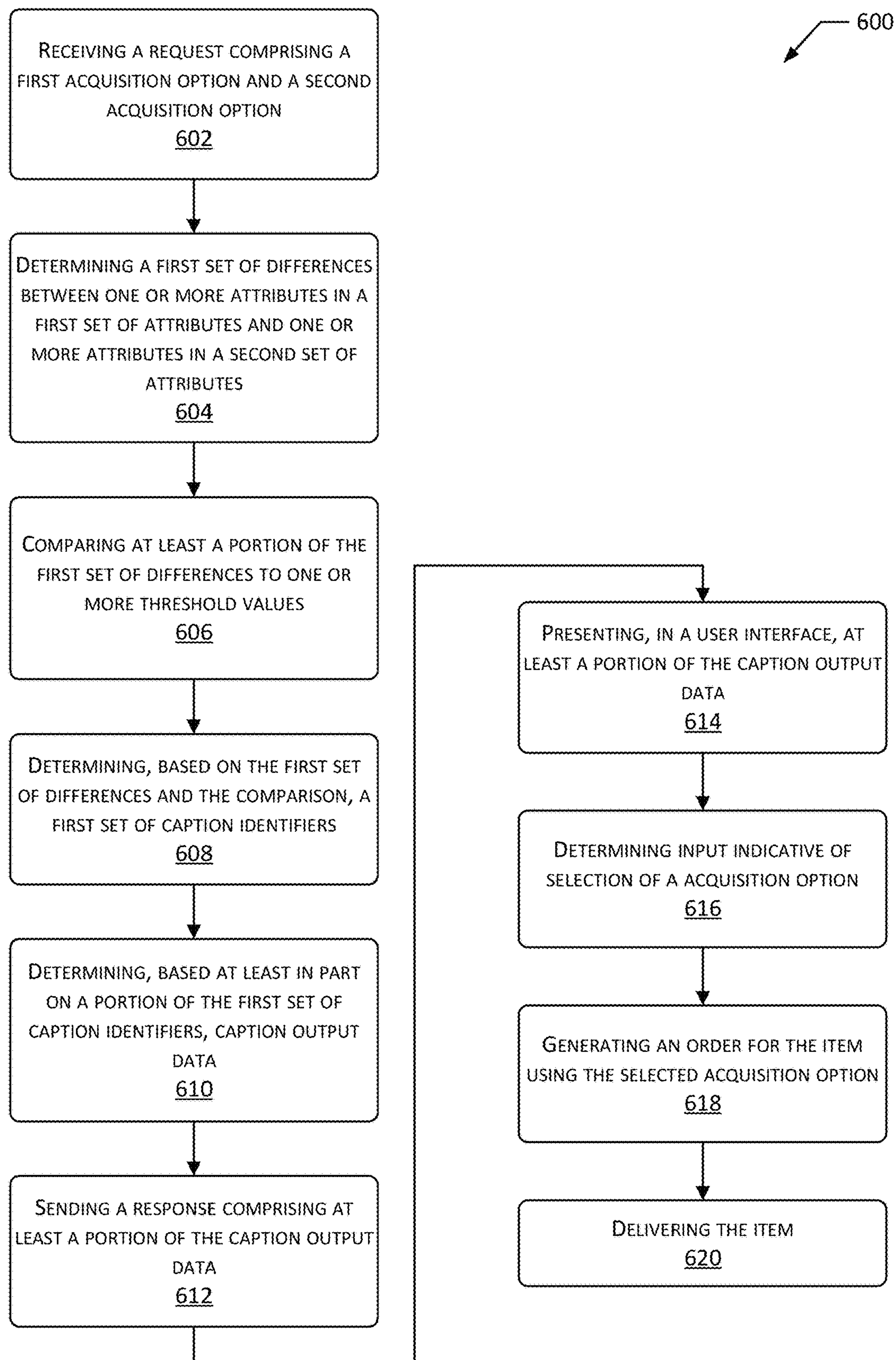


FIG. 6



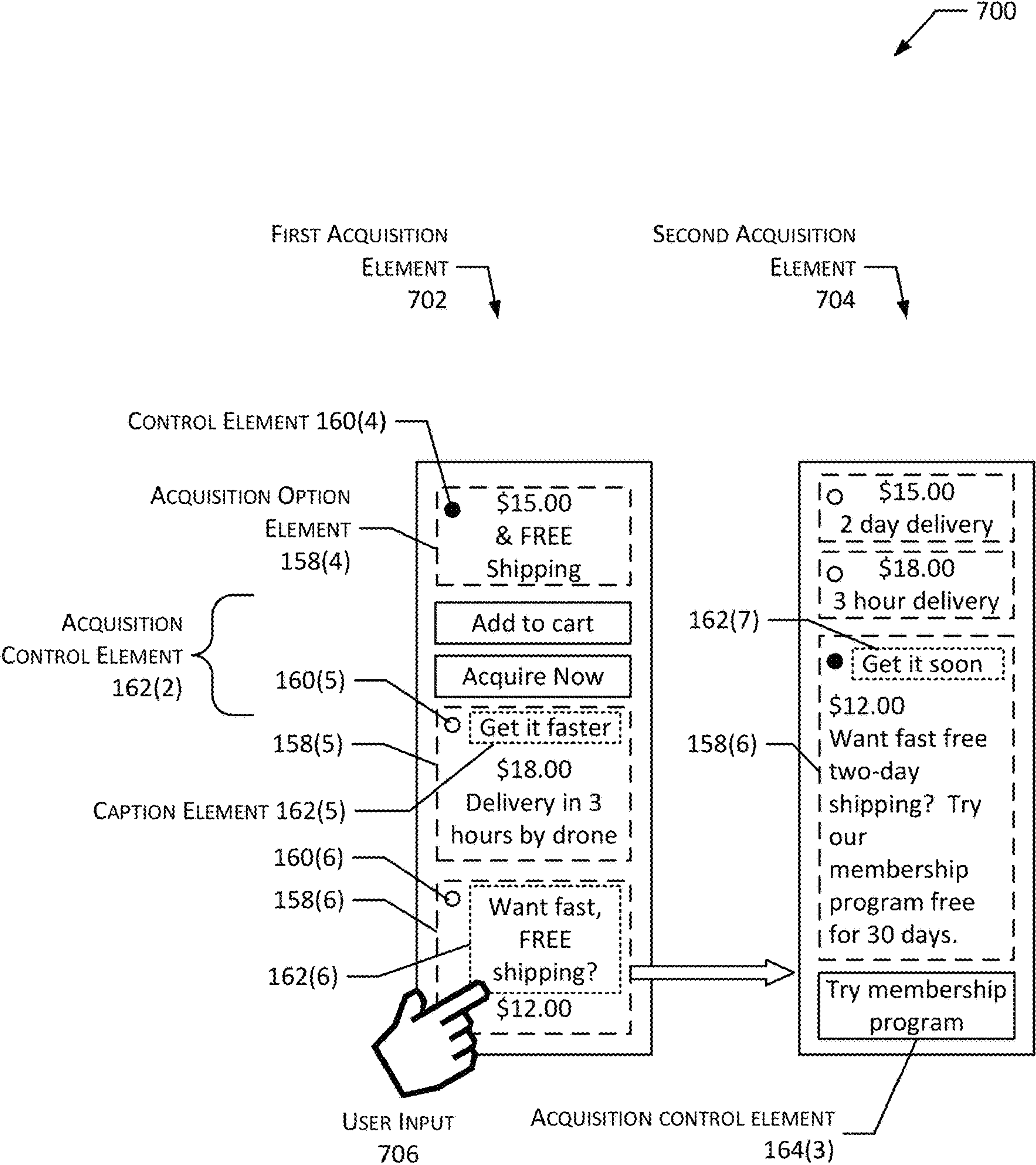


FIG. 7

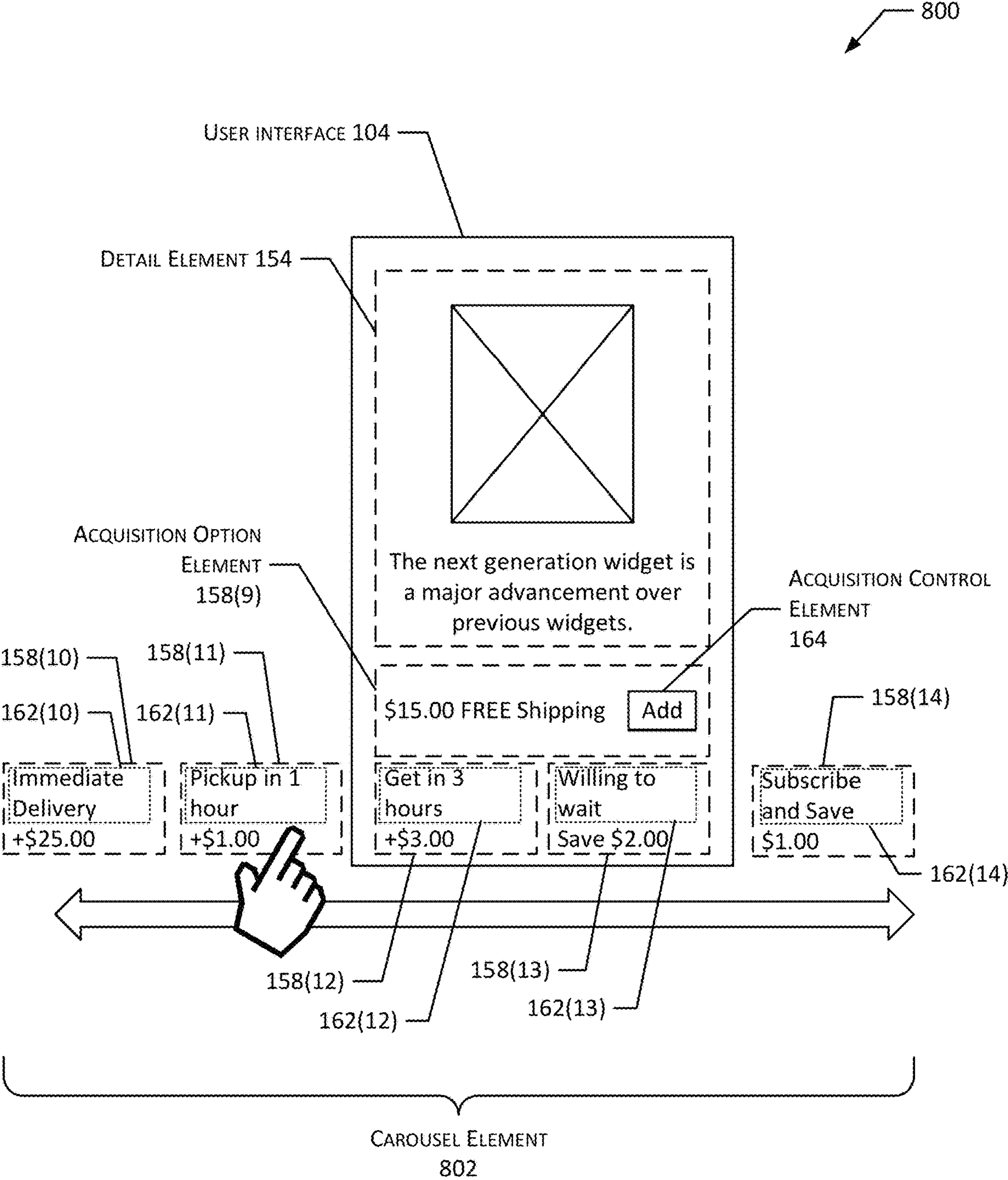


FIG. 8

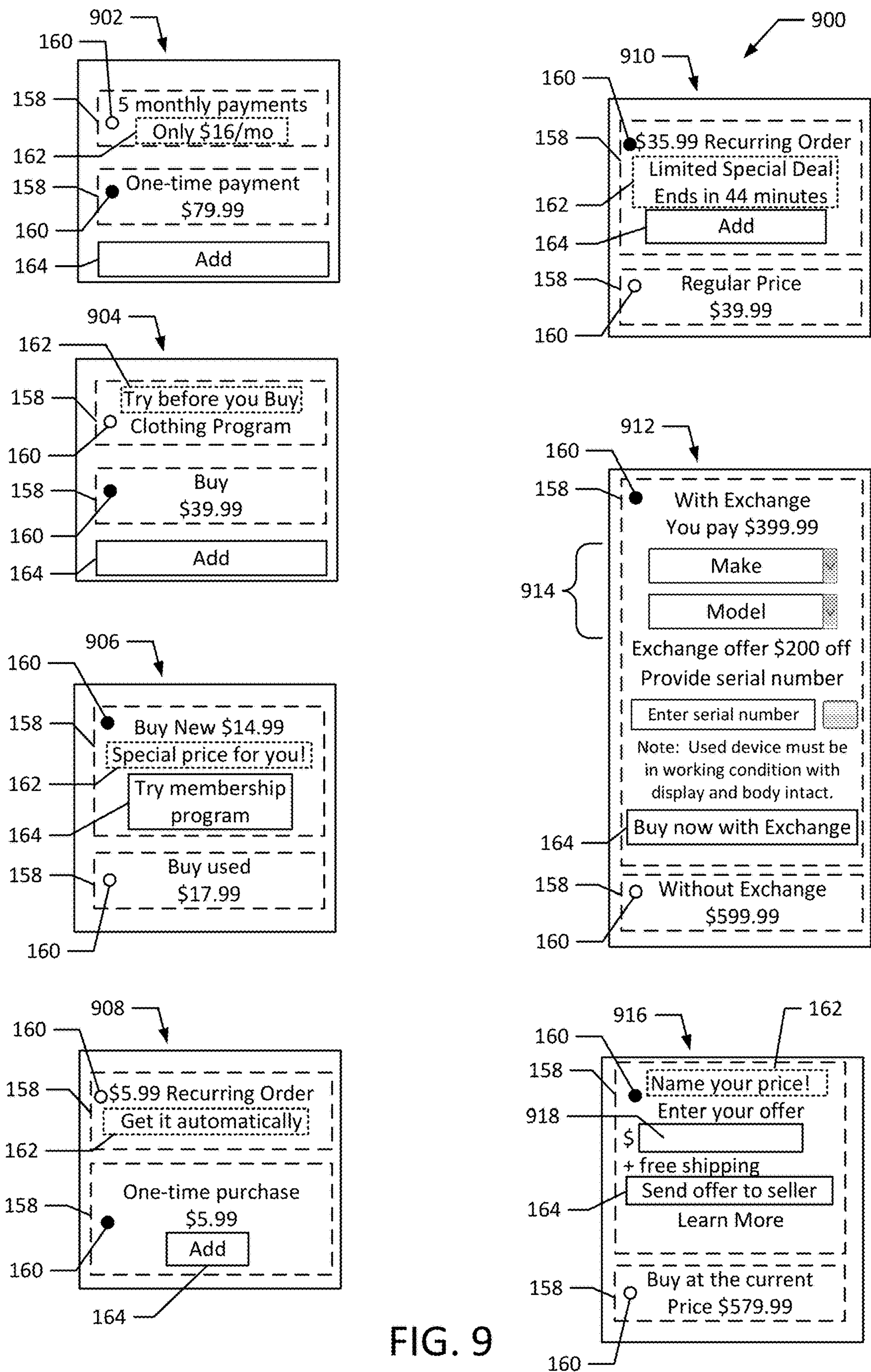


FIG. 9



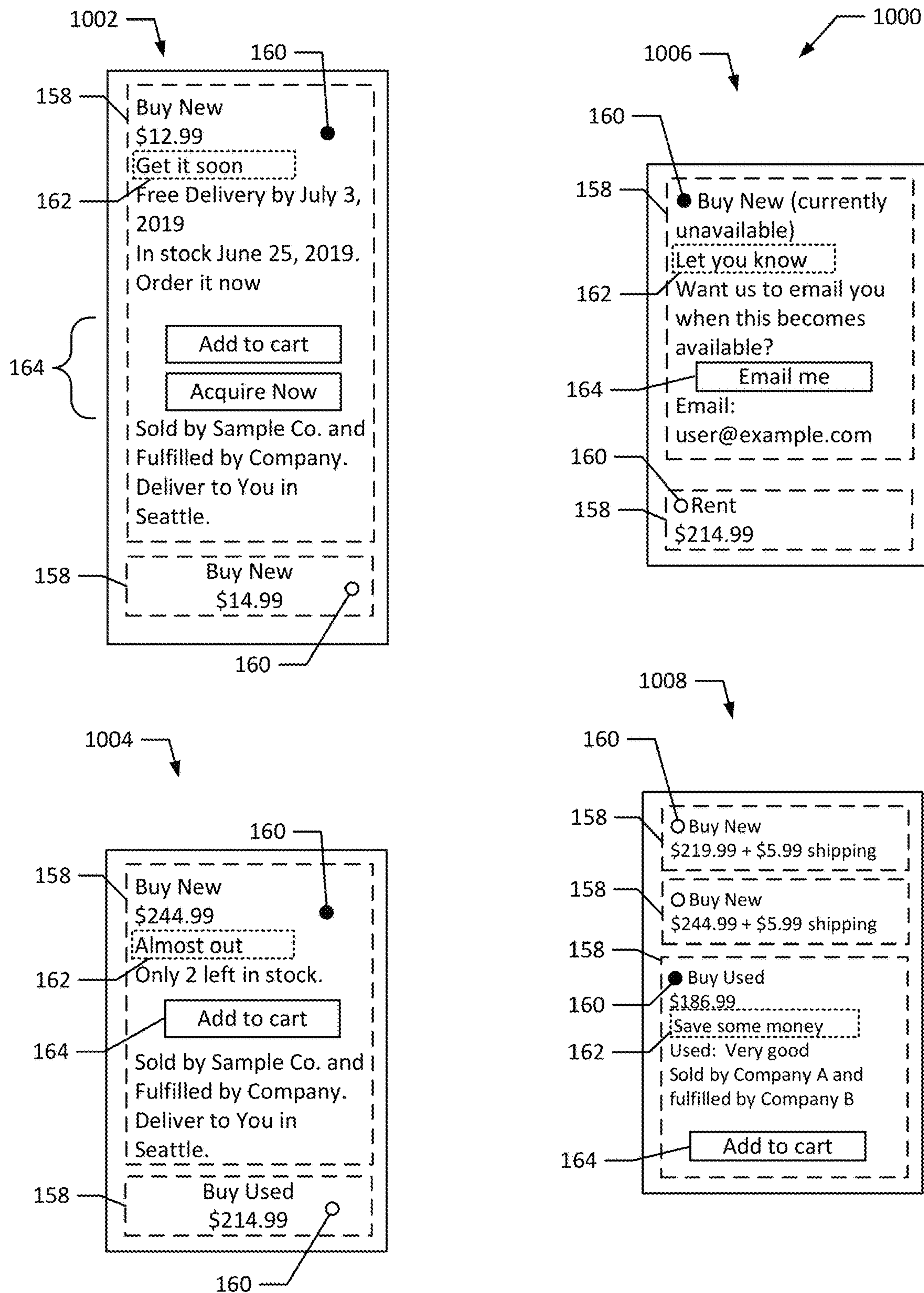


FIG. 10

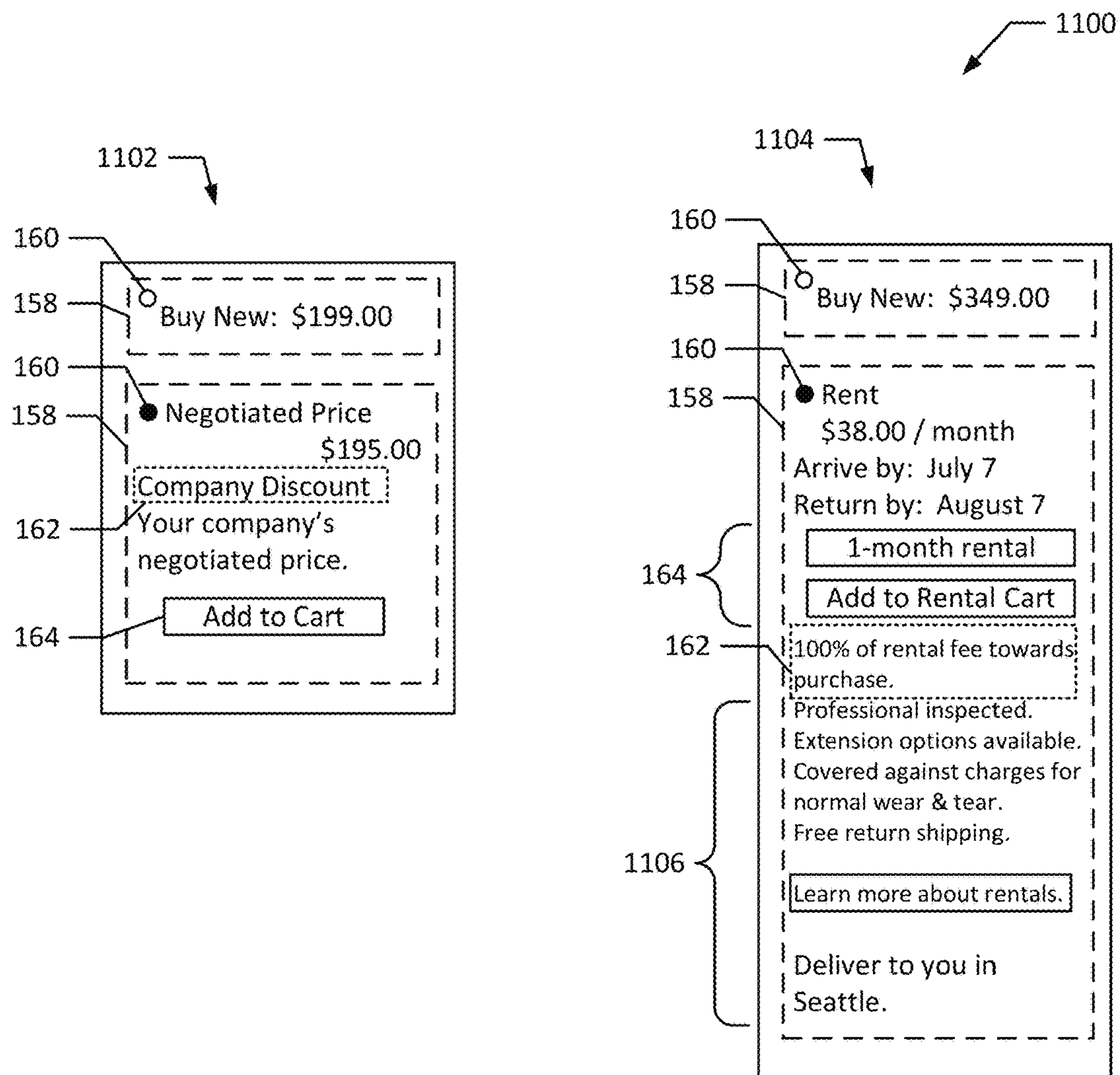


FIG. 11



## 1

**SYSTEM FOR PRESENTING SIMPLIFIED  
USER INTERFACE****BACKGROUND**

A user may acquire items such as goods or services online using various interfaces presented using various devices such as smartphones, tablets, voice activated devices, and so forth.

**BRIEF DESCRIPTION OF FIGURES**

The detailed description is set forth with reference to the accompanying figures. In the figures, the left-most digit(s) of a reference number identifies the figure in which the reference number first appears. The use of the same reference numbers in different figures indicates similar or identical items or features.

FIG. 1 depicts an implementation of a system for determining captions that describe concise reasons as to why a particular option is beneficial to a user and presenting those captions in a user interface, according to one implementation.

FIGS. 2 and 3 depict various types of data associated with determining the captions, according to one implementation.

FIG. 4 is a block diagram of a computing device that may implement the system for determining and presenting captions, according to one implementation.

FIG. 5 is a flow diagram of a method for determining and presenting captions, according to one implementation.

FIG. 6 is a flow diagram of a method for an application programming interface (API) to provide caption output data, according to one implementation.

FIG. 7 depicts a user interface with a plurality of acquisition options that include captions, according to one implementation.

FIG. 8 depicts a user interface with a plurality of acquisition options that include captions presented using a carousel, according to one implementation.

FIGS. 9-11 depict user interfaces that may include captions, according to some implementations.

While implementations are described in this disclosure by way of example, those skilled in the art will recognize that the implementations are not limited to the examples or figures described. It should be understood that the figures and detailed description thereto are not intended to limit implementations to the particular form disclosed but, on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope as defined by the appended claims. The headings used in this disclosure are for organizational purposes only and are not meant to be used to limit the scope of the description or the claims. As used throughout this application, the word “may” is used in a permissive sense (i.e., meaning having the potential to) rather than the mandatory sense (i.e., meaning must). Similarly, the words “include”, “including”, and “includes” mean “including, but not limited to”.

**DETAILED DESCRIPTION**

A user may use a computing device to present a user interface through which the user is able to view items such as goods or services that are available for acquisition. The user may enter search terms, select various categories, view recommended items, and so forth. After a user selects a particular item for acquisition, the user may have many different acquisition options available. An acquisition option

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may be a particular combination of various attributes that describe the fulfillment of that acquisition for that particular item. For example, after picking a specific item for acquisition, the item may be available with different combinations of merchant from which to acquire the item, price, delivery speed, whether the item is new or used, and so forth.

In order to complete the acquisition, the user may need to select one of the acquisition options. However, a user may find it difficult to find how one acquisition option varies from another. The problem becomes acute as more than two acquisition options are available. The user may not be able to easily determine the benefit a particular acquisition option provides with respect to a default acquisition option. For example, to determine how one acquisition option differs from another, traditionally the user would need to carefully inspect the acquisition options while keeping track of this information, such as in their own memory, by taking notes, and so forth. This significantly increases the difficulty associated with the user making a selection of an acquisition option. As a result, the user may use the default acquisition option without considering the other acquisition options, or may select an acquisition option which is less than optimal to that user due to a misunderstanding. While trying to compare the various acquisition options, the user may navigate back-and-forth between the various options, which results in additional network calls and increase computational load. For example, the user may navigate to a first acquisition option, use the “back” control in their web browser, navigate to a second acquisition option, use the “back” control again, and so forth, with each of these resulting in various network calls that consume network bandwidth and computational resources that are used to respond to those calls.

Additionally, some user interfaces are constrained. For example, a user may use a graphical user interface (GUI) provided by a smartphone or tablet with limited display screen space. Continuing this example, the display screen is limited in space, and as a result there may be insufficient display space to present all information about the acquisition options simultaneously to allow the user to make a comparison and selection. In another example, the user may use a voice user interface (VUI) provided by a voice activated device that provides audio output and accepts audio input such as the user’s speech. Continuing this example, the voice user interface is only able to present a single piece of information as a stream of audio, and lacks the ability to present several different acquisition options simultaneously for comparison. These constraints may significantly increase the difficulty associated with the selection of the acquisition option.

As a result of these drawbacks, presenting additional acquisition options using traditional techniques may result in a decrease in completion of acquisitions. For example, if the user is unable to keep track of the various acquisition options and their respective benefits, the user may become frustrated. As described above, this may result in either selection of a less than optimal acquisition option by the user, may result in the user abandoning the acquisition altogether, or could produce a negative user experience.

Described in this disclosure is a system that, based on the acquisition options available, determines captions that may then be presented to the user that describe pertinent differences of those acquisition options to assist the user in selection of an acquisition option. Initially, an item for a good or service has been determined. For example, the user may have searched for the item and is viewing a detail page in a GUI or listening to details about the item in a VUI. A



set of acquisition options are determined, including a default or reference acquisition option. Attributes of the remaining (non-default) acquisition options are then compared to determine differences with respect to the reference acquisition option. For example, the first acquisition option is the reference acquisition option and has a sale price of \$15 with two day delivery. The second acquisition option may have a sale price of \$13 with five day delivery. The second acquisition option, with respect to the first acquisition option, exhibits differences of a \$2 saving and an increase in the delivery time from two days to five days.

The differences are then used to determine an associated caption identifier that is indicative of a particular caption associated with a particular acquisition option. A caption may comprise a string of text, icon, logo, audio, or other information. The caption provides clear and concise information about differences between acquisition options, and may describe why a particular option is beneficial to the user. Continuing the earlier example, the second acquisition option may be associated with caption text such as “Willing to wait”, “No hurry”, or “Lower price”.

In one implementation, a particular attribute and corresponding benefit may be prioritized. For example, a lower price may be prioritized as more advantageous than a decrease in shipment time. Prioritization may be predetermined, or may be specified based on user preference for a particular user, acquisition history data for a particular user, and so forth. Given the differences, a single acquisition option may have more than one possible caption which may be associated with different benefits. For example, one benefit may be reduced price while another benefit is a particular delivery method. The prioritization may be used to determine which caption to provide for a given acquisition option. For example, if a first caption and a second caption are both associated with a single acquisition option, the highest priority caption may be selected.

Caption output data is then used to generate user interface data. The user interface data is then used to present a user interface. For example, the caption output data may be used to generate a hypertext markup language (HTML) web page that, when rendered, presents on a display device a GUI that includes user interface elements such as acquisition option elements showing the available acquisition options and caption elements that present the captions associated with those acquisition options. In another example, the caption output data may be presented as a spoken description as the acquisition options are available. Continuing the example, the spoken description may be “get it faster for only three dollars more”.

The determination of captions may be implemented by a caption server with a caption module that provides an application programming interface (API). Other servers, such as a server generating dynamic web content, may send an API request to the caption server. The API request may include a list of acquisition options, context data, and so forth. The caption server may respond with caption output data that includes caption text associated with each of the acquisition options.

With the presentation of the captions in the user interface, the user is able to quickly and effectively choose the acquisition option which offers the best benefit to them at that point in time. The generation and presentation of captions significantly improve the functionality and usability of making acquisitions from a constrained user interface, such as one with limited display area of a GUI or serial presentation such as with a VUI. By presenting the captions, the user does not need to navigate back-and-forth between

several different user interfaces or pages to assess the various acquisition options. By removing this back-and-forth navigation, the amount of network traffic is reduced and computing resources are conserved.

FIG. 1 depicts an implementation of a system 100 for determining and presenting captions, according to one implementation. A user device 102 may comprise a smart-phone, tablet, laptop, desktop computer, in-vehicle system, voice activated device, home automation system, and so forth. The user device 102 is capable of presenting a user interface 104. The user interface 104 may comprise a graphical user interface (GUI) comprising images presented on a display device and input from an input device such as a touch sensor or mouse, a voice user interface (VUI) that uses output from a speaker and input from a microphone, or combinations thereof.

A first server 106 is in communication with the user device 102. For example, the user device 102 may use a network such as the internet to communicate with the first server 106. The first server 106 provides functionality that allows a user of the user device 102 to acquire an item. An item may comprise a good or service. For example, the item may comprise a kitchen appliance that is physically delivered, a service to install the kitchen appliance, an ebook that is electronically delivered, and so forth. By way of illustration and not necessarily as a limitation, the examples in this disclosure describe acquisition of an item. It is understood that other acquisitions may include, but are not limited to purchases, rentals, leases, trade, barter, and so forth.

The first server 106 may receive input data 108 from the user device 102. For example, the user device 102 may send input data 108 that is representative of the user selecting detailed information about an item that a user of the user device 102 may want to acquire. The first server 106 may comprise an acquisition option module 110. The acquisition option module 110 may accept as input at least a portion of the input data 108 and access fulfillment data 112.

The input data 108 may indicate a particular item identifier (item ID). For example, the input data 108 may comprise user input to a search control, data indicative of selection of a particular item from a list, and so forth. In some implementations the input data 108 may comprise data from another module. For example, the input data 108 may comprise information that is indicative of a detail page providing information associated with a particular item ID.

The fulfillment data 112 may comprise data associated with fulfillment of an acquisition. For example, the fulfillment data 112 may comprise information indicative of a warehouse in which the item ID is available, stock level at the warehouse indicative of the quantity on hand, delivery types, and so forth.

The acquisition option module 110 uses the input data 108 and the fulfillment data 112 to determine acquisition option data 114. The acquisition option data 114 comprises a set of one or more acquisition options. For example, the input data 108 may indicate a particular item identifier (item ID). The acquisition option module 110 may then use the fulfillment data 112 to determine one or more merchants selling that particular item ID, price, stock levels, delivery types, delivery time, and so forth. This information is then used to determine an acquisition option.

Each of the acquisition options in the acquisition option data 114 is a particular combination of one or more attributes, such as seller, price, delivery type, delivery time, and so forth for acquisition of that item ID. In some implementations the acquisition option module 110 may rank the acquisition options in the acquisition option data 114. For



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example, the acquisition option module **110** may rank or sort the acquisition options based on one or more attributes, promotional consideration, delivery address, acquisition history, or other factors.

Depending upon various factors, such as the availability of the item, delivery address, and so forth, the acquisition option data **114** may include a plurality of acquisition options. For example, a given item ID may be available for acquisition from ten vendors, each vendor offering several possible delivery types, with different prices for the items, costs for shipping, and so forth. A single item ID may be associated with many different acquisition options. Presentation of the entire list would be infeasible and inadvisable. Infeasible as such a list, even in compact form, would use a significant amount of space on a display device in a GUI or require a tedious verbal recitation in a VUI. Such a presentation would be inadvisable as it would likely confuse the user, and may deter the user from completing the acquisition, or have the user complete the acquisition with an acquisition option that is not what they would have preferred had the presentation been simpler.

The first server **106** may send a caption request **116** to a second server **118**. A caption module **120** at the second server **118** processes the caption request **116**. The caption request **116** may include at least a portion of the acquisition option data **114**. The caption request **116** is described in more detail with regard to FIG. 2.

The caption module **120** determines difference data **122** from the acquisition option data **114** in the caption request **116**. One of the acquisition options may be designated as a reference acquisition option. For example, if the acquisition options are ranked, the first ranked acquisition option may be described as the reference acquisition option while the remaining acquisition options may be described as candidate acquisition options. The caption module **120** determines differences in the same types of attributes of the candidate acquisition options with respect to the reference acquisition option. For example, if the reference acquisition option has a delivery time of 2 days and a first candidate acquisition option has a delivery time of 5.5 days, the difference for the attribute “delivery time” of the candidate acquisition option would be “-3.5 days”. Difference data **122** for several different attributes may be determined. Continuing the example, the reference acquisition option may have a price of \$15 while the first candidate acquisition option has a price of \$13, resulting in a difference for the attribute “price” of the first candidate acquisition option of \$-2, indicating the first candidate acquisition option is less expensive than the reference acquisition option. The various attributes are discussed in more detail with regard to FIG. 2.

The caption module **120** may use threshold data **124** to determine when a difference is deemed to be significant. For example, a difference in cost that is greater than a threshold value of \$1 may be deemed significant. In some implementations the threshold data **124** may specify a threshold of zero. For example, a difference in delivery time for a candidate acquisition option that is less than zero, that indicates a longer delivery time than the reference acquisition option, may be deemed less significant or not indicative of a benefit to the user in and of itself. In comparison, a difference in price that is less than zero, indicating a lower price, may be deemed more significant and indicative of a benefit to the user.

The caption module **120** accesses a caption library **126**. The caption library **126** associates particular caption identifiers (IDs) with other information such as benefit type, language, caption text, and so forth. For example, the

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caption module **120** may use the difference data **122** as compared using the threshold data **124** to determine that the first candidate acquisition option has a longer delivery time (not necessarily a benefit to the user) with a lower price (a benefit to the user). The caption library **126** is discussed in more detail with regard to FIG. 2.

The caption module **120** may prioritize the benefits to be presented in a caption. For example, a reduced price may be prioritized over an increased delivery time for the purposes of selecting a caption. The priorities may be specified at a global or system-wide level, for a particular region, group of users, individual user, and so forth.

In some implementations, other information such as user preference data **128** may be used by the caption module **120**. The user preference data **128** may specify that a particular user identifier associated with a user has a preferred benefit type, preferred language, and so forth. For example, user “Bob” may have a preference for a shorter delivery time while user “Ted” has a preference for lower price. The user preference data **128** is discussed in more detail with regard to FIG. 3.

The caption module **120** may also use acquisition history data **130**. The acquisition history data **130** may provide information indicative of previous selections of acquisition options by a particular user. For example, user “Bob” may typically select the benefit type “shorter delivery time” 95% of the time and “lower price” 5% of the time. The caption module **120** may use the acquisition history data **130** to select a caption which is relevant to the user. In some implementations the acquisition history data **130** may be associated with a particular item ID, category of item, and so forth. For example, a particular user may historically choose a benefit type of “lower price” but an item such as an appliance repair part which is associated with more time sensitive activity may be associated with the benefit type of “shorter delivery time”. The acquisition history data **130** is discussed in more detail with regard to FIG. 3.

Output from the caption module **120** is caption output data **132**. The caption output data **132** provides caption output, such as caption text, for one or more of the acquisition options provided in the caption request **116**. For example, the caption text “Willing to wait” may be provided for the first candidate acquisition option that involves a longer delivery time but lower price. The caption output data **132** is discussed in more detail with regard to FIG. 3.

The caption output data **132**, or at least a portion thereof, is provided to the first server **106**. A user interface module **150** of the first server **106** generates user interface data **152** from the acquisition option data **114** and the caption output data **132**. In some implementations the user interface data **152** may comprise hypertext markup language (HTML), extensible markup language (XML), or other information that is processed to produce the user interface **104**. In some implementations the user device **102** may generate at least a portion of the user interface data **152**.

An example of the user interface **104** is depicted. The user interface **104** may comprise a detail element **154**. The detail element **154** may present information such as details about a particular item ID, features of the item, pictures of the item, and so forth. An acquisition element **156** that presents information and controls associated with an acquisition is also shown. The acquisition element **156** may include one or more acquisition option elements **158**. The acquisition option elements **158** present information about a particular acquisition option, such as present in the acquisition option data **114**. For example, the acquisition option elements **158** may present information such as price, delivery time, and so



forth. Also shown are control elements **160** to select a particular acquisition option. Each acquisition option element **158** may have a control element **160**. For example, the control elements **160** may be implemented as a radio button control, allowing the user to select one of the acquisition options presented in the acquisition option elements **158**. In some implementations the control element **160** may be non-visible or omitted. For example, the control element **160** may comprise a region within which an input such as a touch or click results in the selection of the associated acquisition options.

An acquisition option element **158** may include a caption element **162**. In this illustration, the acquisition option element **158(1)** presents the reference acquisition option from the acquisition option data **114**. As this is the reference acquisition option as used by the caption module **120**, no caption element **162** is present. The acquisition option element **158(2)** depicts a first candidate acquisition option and the associated caption element **162** of “Get it faster”. The user interface **104** thus simplifies the differences described in the difference data **122** and consolidates those differences down to a more concise and simpler user interface that may be accessed without the user changing screens, scrolling for more data, and so forth. As a result, the user interface **104** may be presented on a relatively small form factor display device, such as a wearable device, smart-phone, tablet, laptop, and so forth.

Also shown are acquisition control elements **164**. For example, button controls for “add to cart” and “buy now” are shown. Activation of either of these controls would initiate an acquisition of the item ID currently presented in the detail element **154** using the acquisition option selected by the control element **160(1)** for a particular one of the acquisition option elements **158**.

In some implementations, the second server **118** may implement an application programming interface (API). For example, the first server **106** may send the caption request **116** as an API request and respond with the caption output data **132**.

While the first server **106** and the second server **118** are depicted as individual computing devices, it is understood that they each may comprise a plurality of computing devices, other computing devices (not shown) may also be used during operation of the system **100**, and so forth. The various modules described herein may be implemented by one or more computing devices other than those shown. For example, the acquisition option module **110** may execute on a server different from that executing the user interface module **150**.

The system **100** and examples in this disclosure are described with respect to a graphical user interface (GUI). It is understood that the system **100** may also be used to provide captions in the context of a voice user interface (VUI).

By using the system described in this disclosure, caption output data **132** is generated that may then be used to provide an improved user interface **104**. A user may be informed as to the benefits that the different acquisition options provide relative to the reference acquisition option and select a particular acquisition option from the user interface **104** that best suits their needs. As a result, the user experience is improved.

The system also results in improved performance of the servers by reducing the computational resources associated with an acquisition. For example, by providing the captions which clearly and concisely summarize benefits to the user, the user is less likely to navigate to a different web page,

query the system for more details about the acquisition options, and so forth. As a result, the system is able to service more users.

A reduction in the computational resources that are associated with an acquisition of a particular item may be achieved by selectively computing the acquisition options. For example, N acquisition options may be available for a particular item. The computations involved in determining each of the possible combinations of delivery information, pricing, and so forth, are computationally expensive and may result in a significant increase in network traffic, calls to other servers, and so forth. In some implementations, rather than determining the actual output for each of these possible combinations, the acquisition option module **110** may use approximations of this information to rank the acquisition options in the acquisition option data **114**. Compared to the actual determination of the information for these combinations, the approximations are relatively lightweight with regard to use of computational resources. For example, the approximations may use one or more of heuristics, Monte Carlo methods, and so forth.

The caption module **120** may then determine, such as by calling another server, the actual information for a subset k of the n offers. This results in a significant decrease in the use of computational resources during operation. For example, k may have values of more than 100 while n may be less than 5.

FIGS. 2 and 3 depict various types of data associated with determining the captions, according to one implementation. The data shown in these figures is depicted as tables for ease of illustration, and not necessarily as a limitation. For example, other data structures such as flat files, databases, linked lists, trees, executable code, script, and so forth may be used to store the data. The data shown may also have additional rows, columns, or their equivalent in other data structures.

The acquisition option data **114** may include one or more of an option identifier (ID) **202**, option rank **204**, and one or more attributes in the attribute data **206**. The option ID **202** is indicative of a particular acquisition option. In this illustration, each row in the table is representative of a particular acquisition option. The acquisition option module **110** may associate the option ID **202** with the acquisition option. The option rank **204** indicates a ranking or order of the acquisition options that is determined by the acquisition option module **110**. For example, an acquisition option with an option rank **204** of “1” may be designated as the reference acquisition option, while those acquisition options with lesser option ranks **204** are designated as the candidate acquisition options.

The attribute data **206** may include one or more of seller identifier (ID) **208**, price **210**, delivery time **212**, delivery type **214**, new/used **216**, or other data that is associated with a particular item ID. For example, the other data may include a stock level indicative of a quantity on hand, customer incentives, and so forth. Continuing the example, the customer incentives may include short term discounts, discounts for automatically recurring orders, affinity marketing program rewards, cash back, rebates, promotional offerings, and so forth.

The seller identifier (ID) **208** is representative of the seller who is associated with the acquisition option. For example, the same item ID may be available for acquisition from a plurality of different sellers.



The price **210** is indicative of the price of the item associated with that acquisition option. For example, the price may be specified by the seller indicated by the seller ID **208**.

The delivery time **212** is indicative of how long delivery of the item may take or is promised to take. For example, the delivery time **212** may be indicative of an estimated delivery time or may be indicative of a confirmed or promised delivery time.

The delivery type **214** indicates how the item would be delivered using that acquisition option. For example, the delivery type **214** may be representative of delivery via ground carrier, postal service, pickup by the user from a facility, aerial drone, and so forth. In some implementations the delivery type **214** may be indicative of a particular delivery service or company.

The new/used **216** data provides information indicative of whether the item is new or used. For example, a seller may offer a used item, refurbished item, reconditioned item, and so forth.

In other implementations the acquisition option data **114** may include other information.

The caption request **116** may comprise at least a portion of the acquisition option data **114** and may also include context data **230**. For example, the acquisition option data **114** may include fifteen different acquisition options. The caption request **116** may include all fifteen, or may comprise a subset, such as the top five acquisition options as indicated by the option rank **204**.

The context data **230** may include information such as a user identifier indicative of a particular user, delivery address, and so forth. In some implementations the acquisition option module **110** may use information such as user preference data **128**, acquisition history data **130**, and so forth to determine the acquisition option data **114**. The context data **230** may include information such as preferred benefit type, selected benefit type, and so forth.

The caption module **120** may use the context data **230** to determine which attribute data **206** to consider in determining the caption. For example, if the context data **230** indicates the preferred language is English, the caption module **120** will determine a caption that uses English.

The difference data **122** is also shown. The difference data **122** provides, for individual ones of the acquisition options as indicated by option ID **202**, differences for different types of attributes **240**. The different types of attribute **240** may include one or more of seller difference **242**, price difference **244**, delivery time difference **246**, delivery type difference **248**, new/used difference **250**, and so forth. Other attributes **240** may include promotional programs, subscription options, financing options, payment programs, and so forth. For example, an acquisition option may provide for installment payments.

The differences are determined by the caption module **120** for particular types of attribute **240** with respect to a reference acquisition option. As shown, the reference acquisition option having an option ID **202** of “1” being compared to itself would have no differences. Differences are determined between like attributes. For example, the price difference **244** for the option ID **202** of “2” comprises a difference between the price **210** of option ID “1” and the price **210** of option ID “2”, or \$-2.

One implementation of the caption library **126** is shown. A caption identifier (ID) **260** is indicative of a particular caption and distinguishes that caption from others. In some implementations one or more of a benefit type **262**, language identifier (ID) **264**, or caption text **266** may be associated

with the caption ID **260**. The benefit type **262** may indicate a category of benefit that the particular caption ID **260** is deemed to be applicable to. For example, a caption ID **260** that is associated with a reduced delivery time **212** relative to the reference acquisition option may be associated with the benefit type **262** of “shorter delivery time”. The language identifier (ID) **264** is indicative of the language which that caption is associated with. The caption text **266** comprises text that is used for presentation in the caption element **162**. For example, the caption text **266** may comprise “get it faster”, “need it now”, “like new, save with used”, and so forth. Instead of, or in addition to caption text **266**, the caption ID **260** may be associated with other indicia. For example, the caption ID **260** may be associated with one or more of an icon, graphic data, audio data, dynamic data, or other information. Continuing the example, dynamic data may comprise information that is updated specific to the associated acquisition option. In one implementation, a dynamic data caption text may be “Save 17%” with the “17%” being calculated as a price difference **244** divided by the price of the first acquisition option.

Turning to FIG. **3**, the user preference data **128** may include a user identifier (ID) **302**, and one or more of preferred benefit type **304**, preferred language identifier (ID) **306**, or other information. For example, user ID “54815” prefers the benefit type of “shorter delivery time” and captions in English. The caption module **120** may use this information to select the particular type of caption to use. For example, in some situations a plurality of different captions may be applicable given the differences indicated in the difference data **122**. The captions having a benefit type **262** which matches the preferred benefit type **304** may be selected and provided in the caption output data **132**.

The user preference data **128** may be determined based on completed acquisitions, interactions with a user interface, and so forth. In some implementations, the user preference data **128** may be determined based on the particular types of acquisition options that the user selects within a user interface **104**, based on the navigation controls activated by the user, and so forth. For example, the user may use a control in a user interface **104** to scroll through or otherwise change presentation to show several different acquisition options. Information such as how an acquisition option was presented on screen, whether the user selected it or navigated to another acquisition option, and so forth may be obtained and used to determine the user preference data **128**.

The acquisition history data **130** may include the user ID **302** and one or more of a selected benefit type **320**, selection percentage **322**, or other information. The acquisition history data **130** may provide information indicative of previous selections of acquisition options by a particular user. For example, user “54815” may typically select the benefit type “shorter delivery time” 95% of the time and “lower price” 5% of the time.

The caption output data **132** may comprise the option ID **202** indicative of a particular acquisition option and one or more of the caption text **266** or caption priority **340**. The caption priority **340** may indicate a relative priority of a particular option. For example, the caption module **120** may determine that based on the acquisition history data **130** the user ID “54815” has a history of picking the selected benefit type **320** of “shorter delivery time” 95% of the time and “lower price” 5% of the time. The caption priority **340** may thus indicate that the acquisition option with the caption associated with “get it faster” has a higher priority than the acquisition option with the “willing to wait” caption.



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The user interface module **150** may use the caption output data **132** to generate the user interface data **152** and the resulting user interface **104**. Continuing the example, the user “Bob” who is associated with the user ID “54815” may see in the user interface **104** acquisition option elements **158** that are presented in the user interface **104** in order based on the caption priority **340**. As shown in FIG. 1, the acquisition option with the option ID **202** of “3” which has a caption priority **340** and a caption text **266** of “get it faster” is presented in the acquisition option element **158(2)**, immediately below the reference acquisition option shown in the acquisition option element **158(1)**.

In some implementations the caption priority **340** may be determined dynamically. Techniques such as a multi-armed bandit model or Thompson sampling may be used to determine the effectiveness of presenting particular captions. For example, priorities may be assigned to acquisition options such that two similar captions are presented that provide the same benefit type but with differently worded caption text **266**. The results of which acquisition options are selected by a user may then be used to determine whether one caption text **266** and associated caption ID is more effective than another at securing an acquisition. In another example, Thompson sampling may be used to provide a caption priority **340** of the available acquisition options.

FIG. 4 is a block diagram of a computing device **402** that may implement the system **100** for determining and presenting captions, according to one implementation. The computing device **402** may include one or more of the first server **106** or the second server **118**, and so forth.

While FIG. 4 depicts a single block diagram **400** of a computing device **402**, any number and any type of computing devices **402** may be used to perform the functions described herein. For example, a single server may perform the functions of both the first server **106** and the second server **118**.

One or more power supplies **404** may be configured to provide electrical power suitable for operating the components of the computing device **402**. In some implementations, the power supply **404** may include a rechargeable battery, fuel cell, photovoltaic cell, power conditioning circuitry, and so forth.

The computing device **402** may include one or more hardware processor(s) **406** (processors) configured to execute one or more stored instructions. The processor(s) **406** may include one or more cores. One or more clock(s) **408** may provide information indicative of date, time, ticks, and so forth. For example, the processor(s) **406** may use data from the clock **408** to generate a timestamp, trigger a preprogrammed action, and so forth.

The computing device **402** may include one or more communication interfaces **410**, such as input/output (I/O) interfaces **412**, network interfaces **414**, and so forth. The communication interfaces **410** may enable the computing device **402**, or components of the computing device **402**, to communicate with other computing devices **402** or components of the other computing devices **402**. The I/O interfaces **412** may include interfaces such as Inter-Integrated Circuit (I2C), Serial Peripheral Interface bus (SPI), Universal Serial Bus (USB) as promulgated by the USB Implementers Forum, RS-232, and so forth.

The I/O interface(s) **412** may couple to one or more I/O devices **416**. The I/O devices **416** may include any manner of input devices or output devices associated with the computing device **402**. For example, I/O devices **416** may include touch sensors, keyboards, mouse devices, microphones, image sensors, cameras, scanners, displays, speak-

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ers, haptic devices, printers, and so forth. In some implementations, the I/O devices **416** may be physically incorporated with the computing device **402**. In other implementations, I/O devices **416** may be externally placed.

The network interfaces **414** may be configured to provide communications between the computing device **402** and other devices, such as the I/O devices **416**, routers, access points, and so forth. The network interfaces **414** may include devices configured to couple to one or more networks including local area networks (LANs), wireless LANs (WLANs), wide area networks (WANs), wireless WANs, and so forth. For example, the network interfaces **414** may include devices compatible with Ethernet, Wi-Fi, Bluetooth, ZigBee, Z-Wave, 3G, 4G, LTE, and so forth.

The computing device **402** may include one or more busses or other internal communications hardware or software that allows for the transfer of data between the various modules and components of the computing device **402**.

As shown in FIG. 4, the computing device **402** may include one or more memories **418**. The memory **418** may include one or more computer-readable storage media (CRSM). The CRSM may be any one or more of an electronic storage medium, a magnetic storage medium, an optical storage medium, a quantum storage medium, a mechanical computer storage medium, and so forth. The memory **418** may provide storage of computer-readable instructions, data structures, program modules, and other data for the operation of the computing device **402**. A few example modules are shown stored in the memory **418**, although the same functionality may alternatively be implemented in hardware, firmware, or as a system on a chip (SoC).

The memory **418** may include one or more operating system (OS) modules **420**. The OS module **420** may be configured to manage hardware resource devices such as the I/O interfaces **412**, the network interfaces **414**, the I/O devices **416**, and to provide various services to applications or modules executing on the processors **406**. The OS module **420** may implement a variant of the FreeBSD operating system as promulgated by the FreeBSD Project; UNIX or a UNIX-like operating system; a variation of the Linux operating system as promulgated by Linus Torvalds; the Windows operating system from Microsoft Corporation of Redmond, Wash., USA; or other operating systems.

One or more data stores **422** and one or more of the following modules may also be associated with the memory **418**. The modules may be executed as foreground applications, background tasks, daemons, and so forth. The data store(s) **422** may use a flat file, database, linked list, tree, executable code, script, or other data structure to store information. In some implementations, the data store(s) **422** or a portion of the data store(s) **422** may be distributed across one or more other devices including other computing devices **402**, network attached storage devices, and so forth.

A communication module **424** may be configured to establish communications with one or more other computing devices **402**. Communications may be authenticated, encrypted, and so forth.

The memory **418** may also store the acquisition option module **110**, the caption module **120**, the user interface module **150**, and so forth.

Other modules **426** may also be present in the memory **418**. For example, a user authentication module may authenticate users. In another example, an order generation module may initiate or generate an order based on the selection of an acquisition option and activation of an acquisition control element **164**.



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The data store **422** may store the information described previously, including one or more of the input data **108**, the fulfillment data **112**, the acquisition option data **114**, the difference data **122**, the threshold data **124**, the caption library **126**, the user preference data **128**, the acquisition history data **130**, the caption output data **132**, the user interface data **152**, and so forth.

Other data **428** within the data store(s) **422** may include configurations, settings, preferences, and default values associated with computing devices **402**. Other data **428** may also include encryption keys and schema, access credentials, and so forth.

In different implementations, different computing devices **402** may have different capabilities or capacities. For example, servers may have greater processing capabilities or data storage capacity than the user devices **102**.

FIG. **5** is a flow diagram **500** of a method for determining and presenting captions, according to one implementation. The method may be implemented at least in part by one or more of the user device **102**, the first server **106**, or the second server **118**.

At **502** a request is received comprising a first acquisition option and a second acquisition option associated with acquisition of an item. For example, the first server **106** may send a caption request **116** to the second server **118**.

The first acquisition option may be designated a reference acquisition option. The second acquisition option may be representative of one or more of: a second delivery time of the second acquisition option that is earlier than a first delivery time of the first acquisition option, a second cost of the second acquisition option that is less than a first cost of the first acquisition option, or a second incentive of the second acquisition option that differs from a first incentive of the first acquisition option.

At **504** a first set of attributes and a second set of attributes that are associated with the first set of acquisition options are determined. For example, the attribute data **206** in the acquisition option data **114** may be accessed.

At **506**, a first set of differences are determined between one or more attributes in a first set of attributes and one or more attributes in a second set of attributes. For example, the first set of attributes may comprise the attribute data **206** associated with a first or reference acquisition option while the second set of attributes comprise the attribute data **206** associated with a first candidate acquisition option. The acquisition options are associated with acquisition of the item.

In some implementations, the threshold data **124** may be used to determine whether a difference is to be considered. For example, the difference may be compared to a threshold value in the threshold data **124**. In some implementations the difference that is greater than or less than the threshold value may be determined to be indicative of a difference that is beneficial to present to the user. For example, if the price difference is less than a threshold value of zero (indicating a lower price), the difference may be used to determine the caption ID **202**.

In one implementation the determination of the differences may be determined for particular attributes. For example, a first attribute and a second attribute that are associated with the first acquisition option are determined. A third attribute and a fourth attribute that are associated with the second acquisition option are determined. The first attribute and the third attribute are determined to be representative of a first type of attribute **240**. The second attribute and the fourth attribute are determined to be representative of a second type of attribute **240**. The first type of attribute

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**240** is determined to be associated with a first priority. The second type of attribute **240** is associated with a second priority, wherein the second priority is greater than the first priority. A difference is determined between the first attribute and the third attribute. The first caption identifier **260** is associated with the difference.

At **508**, based on the first set of differences a first set of caption identifiers are determined. For example, the caption module **120** may determine the difference data **122** as described above which is indicative of the differences between the first reference acquisition option and the first candidate acquisition option.

The caption module **120** may then use the difference data **122** and the caption library **126** to determine the caption IDs **260** that correspond to one or more of the acquisition options. As described above, the caption module **120** may also use the threshold data **124**, the user preference data **128**, the acquisition history data **130**, and so forth.

The acquisition options may be assessed using the threshold data **124**, and acquisition options which are not deemed suitable may be disregarded from further consideration. For example, a third acquisition option may be determined that has a third set of attributes associated with acquisition of the item. A second set of differences between one or more attributes in the first set of attributes and one or more attributes in the third set of attributes is determined. A first difference in the second set of differences is determined to be greater than a threshold value. Continuing the example, the difference may be a price difference, and the threshold value may be zero. The first difference being greater than zero, the third acquisition option does not provide a lower price to the user. The third acquisition option may be disregarded from further consideration, and is not presented in the first user interface **104**.

In one implementation, the determination of the differences may be determined for several attributes and the caption may be prioritized to a particular one of those differences. For example, a first attribute and a second attribute are determined that are associated with the first acquisition option. A third attribute and a fourth attribute that are associated with the second acquisition option are determined. A first difference between the first attribute and the third attribute is determined. A second difference between the second attribute and the fourth attribute is determined. The first difference is determined to be associated with a first priority. The second difference is determined to be associated with a second priority, wherein the second priority is greater than the first priority. The first caption identifier **260** is then determined to be associated with the fourth attribute.

The priority may be associated with a particular type of attribute **240**, a magnitude of the difference, and so forth. For example, the magnitude of the difference may comprise an absolute value of the difference, such that an acquisition option with an unusually great difference may be presented.

Based at least in part on a portion of the first set of caption identifiers, caption output data **132** is determined. For example, the caption module **120** may only include in the caption output data **132** the captions in the top five as indicated by the caption priority **340**.

As described above, in some implementations the caption module **120** may use one or more of user preference data **128**, acquisition history data **130**, or other data to determine the caption output data **132**. For example, a first user ID **302** that is associated with access to the first user interface **104** may be determined. The first caption ID **260** may be determined based at least in part on the first user identifier **302**. Continuing the example, the caption associated with the



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preferred benefit type **304** or selected benefit type **320** may be included in the caption output data **132**. In some implementations the caption priority **340** may be based at least in part on this association. For example, a caption that matches a preferred benefit type **304** may have a higher caption priority **340** than a caption that does not.

In another example the acquisition history data **130** may be determined that is indicative of previous acquisition option selections. The first caption ID **260** may be determined based at least in part on the acquisition history data **130**.

In some implementations, the caption output data **132** may be determined based at least in part on a priority associated with a benefit type **262**. Some benefit types **262** may be associated with a greater priority than others. For example, the benefit type **262** “lower price” may have a priority of “1” while the benefit type **262** “shorter delivery time” may have a lesser priority of “2”.

Based on the first set of differences, a second caption identifier **260** that is associated with the second acquisition option is determined. A first benefit type **262** associated with the first caption identifier **260** is determined. A second benefit type **262** associated with the second caption identifier **260** is determined. The inclusion of a particular caption in the caption output data **132** may be determined based on a comparison of priority for the benefit types **262**. For example, the caption output data **132** may include only the top three ranked benefit types **262**.

A response may be sent that comprises at least a portion of the caption output data **132**. For example, the caption output data **132** may be sent to the first server **106**.

At **510** at least a portion of the caption output data **132** is presented in the user interface **104**. For example, the user interface module **150** may use the acquisition option data **114** and the caption output data **132** to determine the user interface data **152**. The user interface data **152** is then used to present the user interface **104** on a display of the user device **102** that shows an acquisition option element **158** and an associated caption element **162** which may include the caption text **266**.

At **512** input indicative of a selection of an acquisition option is determined. For example, the user may select an acquisition option by activating a control element **160** in the user interface **104** and activating an acquisition control element **164**. The user device **102** may send data indicative of this selection to the first server **106** or another computing device **402**.

At **514** an order for the item is generated using the selected acquisition option. In another implementation a command that initiates the order may be generated.

At **516** the order is fulfilled according to the selected acquisition option and the item is delivered.

FIG. **6** is a flow diagram **600** of a method for an application programming interface (API) to provide caption output data **132**, according to one implementation. The method may be implemented at least in part by one or more of the user device **102**, the first server **106**, or the second server **118**.

At **602** a request comprising a first acquisition option having a first set of attributes associated with acquisition of an item and a second acquisition option having a second set of attributes associated with acquisition of the item is received. For example, the second server **118** may be configured to receive an API request.

At **604** a first set of differences between one or more attributes in the first set of attributes and one or more attributes in the second set of attributes is determined.

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At **606** at least a portion of the first set of differences are compared to one or more threshold values. For example, a difference may be compared to a threshold value stored in the threshold data **124**.

At **608**, based on the first set of differences and the comparison(s) of the difference(s), a first set of caption identifiers **260** is determined. For example, if the difference in delivery time is greater than a threshold value indicative of faster delivery, a caption identifier **260** associated with faster delivery may be selected.

At **610**, based at least in part on at least a portion of the first set of caption identifiers **260**, determine caption output data **132**. For example, the captions having the  $k$  highest priority, where  $k$  is a positive integer, may be included in the caption output data **132**.

At **612** a response is sent that comprises at least a portion of the caption output data **132**. For example, the caption output data **132** may be sent as an API response to the first server **106**.

At **614** at least a portion of the caption output data **132** is presented in the user interface **104**.

At **616** input indicative of a selection of an acquisition option is determined.

At **618** an order for the item is generated using the selected acquisition option. In another implementation a command that initiates the order may be generated.

At **620** the order is fulfilled according to the selected acquisition option and the item is delivered.

FIG. **7** depicts a user interface **700** with a plurality of acquisition options that include captions, according to one implementation. The acquisition element **156** may be dynamic, changing in response to user input. For example, as a user activates particular control elements **160** to select a particular acquisition option element **158** representative of a particular acquisition option, additional information may be presented as shown here.

A first acquisition element **702** and a second acquisition element **704** are shown. The first acquisition element **702** includes acquisition option elements **158(4)**, **158(5)**, and **158(6)** with their respective control elements **160(4)**, **160(5)**, and **160(6)**. Caption elements **162(5)** and **162(6)** and presented with regard to acquisition option elements **158(5)** and **158(6)**, respectively. Also shown are acquisition control elements **162(2)**.

In this illustration, the reference acquisition option is selected by default as shown by the solid black circle of control element **160(4)**. The caption elements **162** provide the user with a clear and concise description of the benefits to the user associated with the particular acquisition options. The user provides user input **706** to select the acquisition option element **158(6)**. Upon selection, the second acquisition element **704** may be presented. In one implementation the second acquisition element **704** may replace the first acquisition element **702**. In another implementation the first acquisition element **702** and the second acquisition element **704** may both be presented.

The second acquisition element **704** presents the acquisition option elements **158** as before, but the acquisition option element **158(6)** has been expanded to provide more information. Information associated with the other acquisition option elements **158(4)** and **158(5)** may be reduced as shown here to provide more display area for the selected acquisition option element **158(6)**. In this illustration the caption element **162(7)** for the acquisition option element **158(6)** has changed relative to the first acquisition element **702**. For example, in the first acquisition element **702** the caption reads “Want fast, FREE shipping?” while the cap-



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tion for the second acquisition element **704** reads “get it soon”. This change in caption may be due to the context of the information presented in the second acquisition element **704**. For example, the additional detail as shown in the acquisition option element **158(6)** of the second acquisition element **704** would be redundant to the “want fast, FREE shipping” caption. Instead, the caption now presents “get it soon” emphasizing the speedy shipment without being duplicative.

The second acquisition element **704** also includes an acquisition control element **164(3)**. In this illustration, the acquisition control element **164(3)** corresponds to the acquisition option presented by the acquisition option element **158(6)** which refers to a membership program.

FIG. **8** is a depiction **800** of a user interface **104** with a plurality of acquisition options that include captions presented using a carousel element **802**, according to one implementation. Also visible in the user interface **104** is a detail element **154** and an acquisition option element **158(9)** with an acquisition control element **164**. Proximate to one edge of the user interface **104** is a carousel element **802** that is configured to present at a given time, a subset of the acquisition option elements **158** representing acquisition options for the item depicted in the detail element **154**. By providing an input such as a finger gesture on a touch sensor, different acquisition option elements **158** may be presented and then selected by the user. In this illustration, the acquisition option element **158** in the carousel element **802** includes a caption element **162** which provides information indicative of a difference between the acquisition option associated with that acquisition option element **158** and the acquisition option element **158(9)**.

FIGS. **9-11** depict user interfaces **104** that may include captions, according to some implementations. These user interfaces **104** may be presented individually, or in conjunction with a detail element **154**. For example, the user interfaces **104** depicted in FIGS. **9-11** may be presented as an accordion graphical user interface feature. The user interfaces may comprise one or more of acquisition option elements **158**, control elements **160**, caption elements **162**, acquisition control elements **164**, or other elements. For example, a user interface **912** may include selection elements **914** to allow for the selection of a make and model of a device for return credit. In another example, a user interface **104** may include information **1106** about a program associated with the acquisition option.

In other implementation other user interface arrangements may be used.

The processes discussed in this disclosure may be implemented in hardware, software, or a combination thereof. In the context of software, the described operations represent computer-executable instructions stored on one or more computer-readable storage media that, when executed by one or more hardware processors, perform the recited operations. Generally, computer-executable instructions include routines, programs, objects, components, data structures, and the like that perform particular functions or implement particular abstract data types. Those having ordinary skill in the art will readily recognize that certain steps or operations illustrated in the figures above may be eliminated, combined, or performed in an alternate order. Any steps or operations may be performed serially or in parallel. Furthermore, the order in which the operations are described is not intended to be construed as a limitation.

Embodiments may be provided as a software program or computer program product including a non-transitory computer-readable storage medium having stored thereon

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instructions (in compressed or uncompressed form) that may be used to program a computer (or other electronic device) to perform processes or methods described in this disclosure. The computer-readable storage medium may be one or more of an electronic storage medium, a magnetic storage medium, an optical storage medium, a quantum storage medium, and so forth. For example, the computer-readable storage media may include, but is not limited to, hard drives, floppy diskettes, optical disks, read-only memories (ROMs), random access memories (RAMs), erasable programmable ROMs (EPROMs), electrically erasable programmable ROMs (EEPROMs), flash memory, magnetic or optical cards, solid-state memory devices, or other types of physical media suitable for storing electronic instructions. Further, embodiments may also be provided as a computer program product including a transitory machine-readable signal (in compressed or uncompressed form). Examples of transitory machine-readable signals, whether modulated using a carrier or unmodulated, include, but are not limited to, signals that a computer system or machine hosting or running a computer program can be configured to access, including signals transferred by one or more networks. For example, the transitory machine-readable signal may comprise transmission of software by the Internet.

Separate instances of these programs can be executed on or distributed across any number of separate computer systems. Although certain steps have been described as being performed by certain devices, software programs, processes, or entities, this need not be the case, and a variety of alternative implementations will be understood by those having ordinary skill in the art.

Additionally, those having ordinary skill in the art will readily recognize that the techniques described above can be utilized in a variety of devices, environments, and situations. Although the subject matter has been described in language specific to structural features or methodological acts, it is to be understood that the subject matter defined in the appended claims is not necessarily limited to the specific features or acts described. Rather, the specific features and acts are disclosed as exemplary forms of implementing the claims.

What is claimed is:

1. A system comprising:

one or more memories storing computer-executable instructions; and

one or more hardware processors to execute the computer-executable instructions to:

receive user input to acquire an item;

determine a first acquisition option for acquisition of the item, wherein the first acquisition option includes a first attribute indicative of a characteristic by which the item is able to be acquired;

determine a second acquisition option for the acquisition of the item, wherein the second acquisition option includes a second attribute indicative of the characteristic by which the item is able to be acquired;

determine a difference between the first attribute of the first acquisition option and the second attribute of the second acquisition option;

determine that the difference between the first attribute and the second attribute is greater than a threshold value;

in response to the difference associated with the first acquisition option and the second acquisition option being greater than the threshold value, determine a first caption that comprises text indicative of a first



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benefit associated with the second acquisition option, wherein the first benefit is associated with the difference between the first attribute and the second attribute;

present a user interface that includes: 5

- the first acquisition option in a first portion of the user interface; and
- the second acquisition option and the first caption in a second portion of the user interface;

receive user input indicative of selection of the second acquisition option; and 10

generate an order for the acquisition of the item using the second acquisition option.

**2.** A method performed using one or more computing devices, the method comprising: 15

- determining a first acquisition option having a first set of attributes associated with acquisition of an item, wherein the first set of attributes indicates one or more characteristics by which the item is able to be acquired; 20
- determining a second acquisition option having a second set of attributes associated with acquisition of the item, wherein the second set of attributes indicates the one or more characteristics by which the item is able to be acquired; 25
- determining a first difference between a first attribute of the first set of attributes and a second attribute of the second set of attributes;
- determining that the first difference is greater than a first threshold value; 30
- in response to the first difference being greater than the first threshold value,
- determining a first caption identifier that is associated with the first difference;
- determining, based at least in part on the first caption identifier, a first caption output, wherein the first caption output is indicative of the first difference; 35
- causing presentation in a first user interface of a first user interface element associated with the first acquisition option; and 40
- causing presentation in the first user interface of a second user interface element associated with the second acquisition option and the first caption output.

**3.** The method of claim 2, wherein the second acquisition option is representative of one or more of: 45

- a second delivery time of the second acquisition option that is earlier than a first delivery time of the first acquisition option,
- a second cost of the second acquisition option that is less than a first cost of the first acquisition option, or 50
- a second incentive of the second acquisition option that differs from a first incentive of the first acquisition option.

**4.** The method of claim 2, further comprising: 55

- determining a second difference between a third attribute of the first set of attributes and a fourth attribute of the second set of attributes, wherein the second difference is greater than a second threshold value, and wherein the determining the first caption identifier is further in response to the second difference being greater than the second threshold value. 60

**5.** The method of claim 2, wherein the first user interface comprises one or more of a graphical user interface or a voice user interface.

**6.** The method of claim 4, further comprising: 65

- determining the first attribute and the third attribute are representative of a first type of attribute;

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determining the second attribute and the fourth attribute are representative of a second type of attribute;

determining that the first type of attribute is associated with a first priority; and

determining that the second type of attribute is associated with a second priority, wherein the second priority is less than the first priority; and

wherein the first caption identifier is associated with the first difference in response to the second priority being less than the first priority.

**7.** The method of claim 4, further comprising:

- determining that the first difference is associated with a first priority; and
- determining that the second difference is associated with a second priority, wherein the second priority is less than the first priority; and

wherein the first caption identifier indicative of the first difference is determined based at least in part on the second priority being less than the first priority.

**8.** The method of claim 2, further comprising:

- determining a first user identifier that is associated with access to the first user interface;
- determining acquisition history data associated with the first user identifier, wherein the acquisition history data indicates one or more previous acquisition option selections associated with the first user identifier; and
- determining that the first caption identifier corresponds to at least one of the one or more previous acquisition option selections associated with the first user identifier;

wherein the first caption identifier is further determined based at least in part on the acquisition history data.

**9.** The method of claim 2, further comprising:

- determining acquisition history data indicative of one or more previous acquisition option selections associated with the one or more of the second acquisition option or the second set of attributes; and
- determining that the first caption identifier corresponds to at least one of the one or more previous acquisition option selections;

wherein the first caption identifier is further determined based at least in part on the acquisition history data.

**10.** The method of claim 2, further comprising:

- determining input associated with the second user interface element;
- determining input that is indicative of acquisition of the item; and
- generating an order for the item using the second acquisition option.

**11.** The method of claim 2, further comprising:

- determining a third acquisition option having a third set of attributes associated with acquisition of the item;
- determining a second difference between one or more attributes in the first set of attributes and one or more attributes in the third set of attributes;
- determining that the second difference is less than a second threshold value; and

in response to the second difference being less than the second threshold value, disregarding the third acquisition option from presentation in the first user interface.

**12.** The method of claim 2, further comprising:

- determining a second caption identifier that is associated with the first difference;
- determining a first benefit type associated with the first caption identifier;
- determining that the first benefit type is associated with a first priority;



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determining a second benefit type associated with the second caption identifier; and  
 determining that the second benefit type is associated with a second priority that is less than the first priority, wherein the first caption identifier is determined further in response to the second priority being less than the first priority.

**13.** A method performed using one or more computing devices, the method comprising:

receiving an application programming interface (API) request associated with a user identifier, the API request comprising:

a first acquisition option having a first set of attributes associated with acquisition of an item, wherein the first set of attributes indicates one or more characteristics by which the item is able to be acquired; and  
 a second acquisition option having a second set of attributes associated with acquisition of the item, wherein the second set of attributes indicates the one or more characteristics by which the item is able to be acquired;

determining acquisition history data indicative of one or more previous selections of acquisition options that are associated with:

the user identifier; and

one or more attributes of the first set of attributes or the second set of attributes;

wherein the one or more previous selections are indicative of characteristics by which one or more items were previously acquired;

based on the acquisition history data, determining a first set of differences between the one or more attributes in the first set of attributes and the one or more attributes in the second set of attributes;

determining, based on the first set of differences, a first set of caption identifiers;

determining, based at least in part on at least a portion of the first set of caption identifiers, caption output data; and

sending a response comprising at least a portion of the caption output data.

**14.** The method of claim 13, wherein the first set of attributes and the second set of attributes are indicative of one or more of:

a seller,  
 a price,  
 a delivery time,  
 a delivery type,  
 the item being new or used,  
 a stock level, or  
 a customer incentive.

**15.** The method of claim 13, further comprising:  
 determining a first attribute and a second attribute that are associated with the first acquisition option;

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determining a third attribute and a fourth attribute that are associated with the second acquisition option;

determining a first difference between the first attribute and the third attribute;

determining a second difference between the second attribute and the fourth attribute;

determining that the first difference is associated with a first priority;

determining that the second difference is associated with a second priority, wherein the second priority is greater than the first priority; and

wherein the first set of caption identifiers are ranked based on the first priority and the second priority.

**16.** The method of claim 13, further comprising:

determining a count of user identifiers that is associated with the first acquisition option and the second acquisition option, wherein the acquisition history data is further determined based on the count of user identifiers; and

determining that at least a portion of the first set of caption identifiers is associated with one or more previous selections of acquisition options.

**17.** The method of claim 13,

wherein the first set of caption identifiers are also based at least in part on the acquisition history data.

**18.** The method of claim 13, further comprising:

determining, for one or more caption identifiers in the first set of caption identifiers, one or more benefit types;

determining a priority that is associated with the one or more benefit types; and

wherein the caption output data is indicative of the priority that is associated with the one or more benefit types.

**19.** The method of claim 13, further comprising:

determining that an individual difference in the first set of differences that is associated with a first type of attribute is greater than a threshold value associated with the first type of attribute; and

wherein a caption identifier of the first set of caption identifiers is determined for the individual difference in response to the individual difference being greater than the threshold value.

**20.** The system of claim 1, further comprising computer-executable instructions to:

determine a second caption that comprises text indicative of one or more of the first benefit or a second benefit associated with the second acquisition option with respect to the difference; and

determine that a first priority associated with the first caption is greater than a second priority associated with the second caption, wherein the first caption is presented in the second portion of the user interface further in response to the first priority being greater than the second priority.

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